

NHL-NP-49-NP.ST25
SEQUENCE LISTING

<110> JUNGHANS, Claas
SCHROFF, Matthias
JUHL, Christiane
OSWALD, Detlef

<120> Vaccine against Oncovirus Infections, such as infections by
Feline leukemia virus of the cat

<130> NHL-NP-49-NP

<150> DE 102 44 863.9
<151> 2002-09-23

<150> PCT/DE2003/003179
<151> 2003-09-19

<160> 40

<170> PatentIn version 3.3

<210> 1
<211> 1929
<212> DNA
<213> Feline leukemia virus

<220>
<221> gene
<222> (1)..(1929)
<223> DNA sequence wild type "env" gene without signal peptide coding
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<308> NCBI M12500
<309> 2001-02-21
<313> (162)..(1990)

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 <213> Feline leukemia virus

<220>
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 <222> (1)..(1527)
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 <211> 642
 <212> PRT
 <213> Feline leukemia virus

<220>
 <221> PEPTIDE
 <222> (1)..(447)
 <223> Amino acid sequence of the protein corresponding to Seq.ID1

<400> 3

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Trp Asn Leu Ala Phe Leu Val Gly Ile Leu Phe Thr Ile Asp Ile Gly
20 25 30

Met Ala Asn Pro Ser Pro His Gln Ile Tyr Asn Val Thr Trp Val Ile
35 40 45

Thr Asn Val Gln Thr Asn Thr Gln Ala Asn Ala Thr Ser Met Leu Gly
50 55 60

Thr Leu Thr Asp Ala Tyr Pro Thr Leu His Val Asp Leu Cys Asp Leu
65 70 75 80

Val Gly Asp Thr Trp Glu Pro Ile Val Leu Asn Pro Thr Asn Val Lys
85 90 95

His Gly Ala Arg Tyr Ser Ser Ser Lys Tyr Gly Cys Lys Thr Thr Asp
100 105 110

Arg Lys Lys Gln Gln Gln Thr Tyr Pro Phe Tyr Val Cys Pro Gly His
115 120 125

Ala Pro Ser Leu Gly Pro Lys Gly Thr His Cys Gly Gly Ala Gln Asp
130 135 140

Gly Phe Cys Ala Ala Trp Gly Cys Glu Thr Thr Gly Glu Ala Trp Trp
145 150 155 160

Lys Pro Thr Ser Ser Trp Asp Tyr Ile Thr Val Lys Arg Gly Ser Ser
165 170 175

Gln Asp Asn Ser Cys Glu Gly Lys Cys Asn Pro Leu Val Leu Gln Phe
180 185 190

Thr Gln Lys Gly Arg Gln Ala Ser Trp Asp Gly Pro Lys Met Trp Gly
195 200 205

Leu Arg Leu Tyr Arg Thr Gly Tyr Asp Pro Ile Ala Leu Phe Thr Val
210 215 220

Ser Arg Gln Val Ser Thr Ile Thr Pro Pro Gln Ala Met Gly Pro Asn
225 230 235 240

Leu Val Leu Pro Asp Gln Lys Pro Pro Ser Arg Gln Ser Gln Thr Gly
245 250 255

Ser Lys Val Ala Thr Gln Arg Pro Gln Thr Asn Glu Ser Ala Pro Arg
260 265 270

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Ser Val Ala Pro Thr Thr Met Gly Pro Lys Arg Ile Gly Thr Gly Asp
275 280 285

Arg Leu Ile Asn Leu Val Gln Gly Thr Tyr Leu Ala Leu Asn Ala Thr
290 295 300

Asp Pro Asn Lys Thr Lys Asp Cys Trp Leu Cys Leu Val Ser Arg Pro
305 310 315 320

Pro Tyr Tyr Glu Gly Ile Ala Ile Leu Gly Asn Tyr Ser Asn Gln Thr
325 330 335

Asn Pro Pro Pro Ser Cys Leu Ser Thr Pro Gln His Lys Leu Thr Ile
340 345 350

Ser Glu Val Ser Gly Gln Gly Met Cys Ile Gly Thr Val Pro Lys Thr
355 360 365

His Gln Ala Leu Cys Asn Lys Thr Gln Gln Gly His Thr Gly Ala His
370 375 380

Tyr Leu Ala Ala Pro Asn Gly Thr Tyr Trp Ala Cys Asn Thr Gly Leu
385 390 395 400

Thr Pro Cys Ile Ser Met Ala Val Leu Asn Trp Thr Ser Asp Phe Cys
405 410 415

Val Leu Ile Glu Leu Trp Pro Arg Val Thr Tyr His Gln Pro Glu Tyr
420 425 430

Val Tyr Thr His Phe Ala Lys Ala Val Arg Phe Arg Arg Glu Pro Ile
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Ser Leu Thr Val Ala Leu Met Leu Gly Gly Leu Thr Val Gly Gly Ile
450 455 460

Ala Ala Gly Val Gly Thr Gly Thr Lys Ala Leu Leu Glu Thr Ala Gln
465 470 475 480

Phe Arg Gln Leu Gln Met Ala Met His Thr Asp Ile Gln Ala Leu Glu
485 490 495

Glu Ser Ile Ser Ala Leu Glu Lys Ser Leu Thr Ser Leu Ser Glu Val
500 505 510

Val Leu Gln Asn Arg Arg Gly Leu Asp Ile Leu Phe Leu Gln Glu Gly
515 520 525

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Gly Leu Cys Ala Ala Leu Lys Glu Glu Cys Cys Phe Tyr Ala Asp His
530 535 540

Thr Gly Leu Val Arg Asp Asn Met Ala Lys Leu Arg Glu Arg Leu Lys
545 550 555 560

Gln Arg Gln Gln Leu Phe Asp Ser Gln Gln Gly Trp Phe Glu Gly Trp
565 570 575

Phe Asn Lys Ser Pro Trp Phe Thr Thr Leu Ile Ser Ser Ile Met Gly
580 585 590

Pro Leu Leu Ile Leu Leu Leu Ile Leu Leu Phe Gly Pro Cys Ile Leu
595 600 605

Asn Arg Leu Val Gln Phe Val Lys Asp Arg Ile Ser Val Val Gln Ala
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Leu Ile Leu Thr Gln Gln Tyr Gln Gln Ile Lys Gln Tyr Asp Pro Asp
625 630 635 640

Arg Pro

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<212> PRT
<213> Feline leukemia virus

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Ser Glu Val Gln Ala Arg Ala Arg Asn Gln Gly Val Glu Val Arg Lys
20 25 30

Lys Lys Trp Ile Thr Leu Cys Glu Ala Glu Trp Val Met Met Asn Val
35 40 45

Gly Trp Pro Arg Glu Gly Thr Phe Thr Ile Asp Asn Ile Ser Gln Val
50 55 60

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Glu 65 Glu Arg Ile Phe 70 Ala Pro Gly Pro Tyr 75 Gly His Pro Asp Gln 80 Ile
 Pro Tyr Ile Thr 85 Thr Trp Arg Ser Leu 90 Ala Thr Asp Pro Pro 95 Pro Trp
 Val Arg Pro Phe 100 Leu Pro Pro Pro Lys 105 His Pro Arg Thr Asp 110 Pro Pro
 Glu Pro Leu 115 Ser Pro Gln Pro Leu 120 Ala Pro Gln Pro Ser 125 Ser Pro His
 Pro Val 130 Leu Tyr Pro Val 135 Leu Pro Lys Pro Asp 140 Pro Pro Lys Ala Pro
 Val 145 Leu Pro Pro Asn 150 Pro Ser Ser Pro Leu 155 Ile Asp Leu Leu Thr Glu 160
 Glu Pro Pro Pro Tyr 165 Pro Gly Gly His Gly 170 Pro Thr Pro Pro Ser 175 Gly
 Pro Arg Thr Pro 180 Thr Ala Ser Pro Ile 185 Ala Ile Arg Leu Arg 190 Glu Arg
 Arg Glu Asn 195 Pro Ala Glu Lys Ser 200 Gln Ala Leu Pro Leu 205 Arg Glu Asp
 Pro Asn 210 Asn Arg Pro Gln Tyr 215 Trp Pro Phe Ser Ala 220 Ser Asp Leu Tyr
 Asn 225 Trp Lys Leu His Asn 230 Pro Pro Phe Ser Gln 235 Asp Pro Val Ala Leu 240
 Thr Asn Leu Ile Glu 245 Ser Ile Leu Val Thr 250 His Gln Pro Thr Trp 255 Asp
 Asp Cys Gln Gln 260 Leu Leu Gln Ala Leu 265 Leu Thr Ala Glu Glu Arg Gln
 Arg Val Leu 275 Leu Glu Ala Arg Lys 280 Gln Val Pro Gly Glu 285 Asp Gly Arg
 Pro Thr 290 Gln Leu Pro Asn Val 295 Val Asp Glu Ala Phe 300 Pro Leu Thr Arg
 Pro Asn 305 Trp Asp Phe Cys 310 Thr Pro Ala Gly Arg 315 Glu His Leu Arg Leu 320

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Tyr Arg Gln Leu Leu Leu Ala Gly Leu Arg Gly Ala Ala Arg Arg Pro
325 330 335

Thr Asn Leu Ala Gln Val Lys Gln Val Val Gln Gly Lys Glu Glu Thr
340 345 350

Pro Ala Ser Phe Leu Glu Arg Leu Lys Glu Ala Tyr Arg Met Tyr Thr
355 360 365

Pro Tyr Asp Pro Glu Asp Pro Gly Gln Ala Ala Ser Val Ile Leu Ser
370 375 380

Phe Ile Tyr Gln Ser Ser Pro Asp Ile Arg Asn Lys Leu Gln Arg Leu
385 390 395 400

Glu Gly Leu Gln Gly Phe Thr Leu Ser Asp Leu Leu Lys Glu Ala Glu
405 410 415

Lys Ile Tyr Asn Lys Arg Glu Thr Pro Glu Glu Arg Glu Glu Arg Leu
420 425 430

Trp Gln Arg Gln Glu Glu Arg Asp Lys Lys Arg His Lys Glu Met Thr
435 440 445

Lys Val Leu Ala Thr Val Val Ala Gln Asn Arg Asp Lys Asp Arg Gly
450 455 460

Glu Ser Lys Leu Gly Asp Gln Arg Lys Ile Pro Leu Gly Lys Asp Gln
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Cys Ala Tyr Cys Lys Glu Lys Gly His Trp Val Arg Asp Cys Pro Lys
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Arg Pro Arg Lys Lys Pro Ala Asn Ser Thr Leu Leu
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<212> DNA
<213> Feline leukemia virus

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<222> (1)..(1530)
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 <212> PRT
 <213> Feline leukemia virus

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20 25 30

Lys Lys Trp Ile Thr Leu Cys Glu Ala Glu Trp Val Met Met Asn Val
35 40 45

Gly Trp Pro Arg Glu Gly Thr Phe Thr Ile Asp Asn Ile Ser Gln Val
50 55 60

Glu Glu Arg Ile Phe Ala Pro Gly Pro Tyr Gly His Pro Asp Gln Ile
65 70 75 80

Pro Tyr Ile Thr Thr Trp Arg Ser Leu Ala Thr Asp Pro Pro Pro Trp
85 90 95

Val Arg Pro Phe Leu Pro Pro Pro Lys His Pro Arg Thr Asp Pro Pro
100 105 110

Glu Pro Leu Ser Pro Gln Pro Leu Ala Pro Gln Pro Ser Ala Pro Pro
115 120 125

Ile Ser Ser Leu Tyr Pro Val Leu Pro Lys Pro Asp Pro Pro Lys Ala
130 135 140

Pro Val Leu Pro Pro Asn Pro Ser Ser Pro Leu Ile Asp Leu Leu Thr
145 150 155 160

Glu Glu Pro Pro Pro Tyr Pro Gly Gly His Gly Pro Thr Pro Pro Ser
165 170 175

Gly Pro Arg Thr Pro Thr Ala Ser Pro Ile Ala Ser Arg Leu Arg Glu
180 185 190

Arg Arg Glu Asn Pro Ala Glu Lys Ser Gln Ala Leu Pro Leu Arg Glu
195 200 205

Asp Pro Asn Asn Arg Pro Gln Tyr Trp Pro Phe Ser Ala Ser Asp Leu
210 215 220

Tyr Asn Trp Lys Leu His Asn Pro Pro Phe Ser Gln Asp Pro Val Ala
225 230 235 240

Leu Thr Asn Leu Ile Glu Ser Ile Leu Val Thr His Gln Pro Thr Trp
245 250 255

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Asp Asp Cys Gln Gln Leu Leu Gln Ala Leu Leu Thr Ala Glu Glu Arg
260 265 270

Gln Arg Val Leu Leu Glu Ala Arg Lys Gln Val Pro Gly Glu Asp Gly
275 280 285

Arg Pro Thr Gln Leu Pro Asn Val Val Asp Glu Ala Phe Pro Leu Thr
290 295 300

Arg Pro Asn Trp Asp Phe Cys Thr Pro Ala Gly Arg Glu His Leu Arg
305 310 315 320

Leu Tyr Arg Gln Leu Leu Leu Ala Gly Leu Arg Gly Ala Ala Arg Arg
325 330 335

Pro Thr Asn Leu Ala Gln Val Lys Gln Val Val Gln Gly Lys Glu Glu
340 345 350

Thr Pro Ala Ser Phe Leu Glu Arg Leu Lys Glu Ala Tyr Arg Met Tyr
355 360 365

Thr Pro Tyr Asp Pro Glu Asp Pro Gly Gln Ala Thr Ser Val Ile Leu
370 375 380

Ser Phe Ile Tyr Gln Ser Ser Pro Asp Ile Arg Asn Lys Leu Gln Arg
385 390 395 400

Leu Glu Gly Leu Gln Gly Phe Thr Leu Ser Asp Leu Leu Lys Glu Ala
405 410 415

Glu Lys Ile Tyr Asn Lys Arg Glu Thr Pro Glu Glu Arg Glu Glu Arg
420 425 430

Leu Trp Gln Arg Gln Glu Glu Arg Asp Lys Lys Arg His Lys Glu Met
435 440 445

Thr Lys Val Leu Ala Thr Val Val Ala Gln Asn Arg Asp Lys Asp Arg
450 455 460

Gly Glu Ser Lys Leu Gly Asp Gln Arg Lys Ile Pro Leu Gly Lys Asp
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Lys Arg Pro Arg Lys Lys Pro Ala Asn Ser Thr Leu Leu

<210> 7
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 <213> Feline leukemia virus

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 <222> (1)..(1929)
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gtgaggttca ggagggagcc catctccctg acagtggccc tgatgctggg gggcctgaca      1380
gtgggggggca ttgctgctgg ggtgggcaca ggcaccaagg ccctgctgga aacagcccag      1440

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<210> 8
<211> 1440
<212> DNA
<213> Feline leukemia virus

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<222> (1)..(1440)
<223> DNA Sequence of the mutagenized "env" gene (gp70)

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cccttctatg tgtgccctgg ccatgcccc tccctggggc ccaagggcac cactgtggg 420
ggggccagg atggcttctg tgctgcctgg ggctgtgaaa ccacagggga ggcctgggtg 480
aagcccacct cctcctggga ctacatcaca gtgaagagg gctcctcca ggacaactcc 540
tgtgagggca agtgaaccc cctgggtgctg cagttcaccc agaagggcag gcaggcctcc 600
tgggatggcc ccaagatgtg gggcctgagg ctgtacagga caggctatga cccattgcc 660
ctgttcacag tgtccaggca ggtgtccacc atcaccccc cccaggccat gggccccaac 720
ctggtgctgc ctgaccagaa gccccctcc aggcagtccc agacaggctc caagggtggc 780
accagaggc cccagaccaa tgagtctgcc cccaggctctg tggccccac caccatgggc 840
ccaagagga ttggcacagg ggacaggctg atcaacctgg tgcagggcac ctacctggcc 900
ctgaatgcc cagaccccaa caagaccaag gactgtctggc tgtgcctggt gtccaggccc 960

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ccctactatg agggcattgc catcctgggc aactactcca accagaccaa cccccccccc 1020
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tgcattggca cagtgcccaa gaccaccag gccctgtgca acaagacca gcagggccac 1140
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<210> 9
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 <212> PRT
 <213> Feline leukemia virus

<220>
 <221> PEPTIDE
 <222> (1)..(642)
 <223> Amino acid sequence of the protein corresponding to Seq.ID7

<400> 9

Met Glu Ser Pro Thr His Pro Lys Pro Ser Lys Asp Lys Thr Leu Ser
 1 5 10 15

Trp Asn Met Val Phe Leu Val Gly Ile Leu Phe Thr Ile Asp Ile Gly
 20 25 30

Met Ala Asn Pro Ser Pro Pro Arg Ile Tyr Asn Val Thr Trp Val Ile
 35 40 45

Thr Asn Val Gln Thr Asn Thr Gln Ala Asn Ala Thr Ser Met Leu Gly
 50 55 60

Thr Leu Thr Asp Ala Tyr Pro Thr Leu His Val Asp Leu Cys Asp Leu
 65 70 75 80

Val Gly Asp Thr Trp Glu Pro Ile Pro Leu Asn Pro Thr Asn Val Lys
 85 90 95

His Gly Ala Arg Tyr Ser Ser Ser Lys Tyr Gly Cys Lys Thr Thr Asp
 100 105 110

Arg Lys Lys Gln Gln Gln Thr Tyr Pro Phe Tyr Val Cys Pro Gly His
 115 120 125

Ala Pro Ser Leu Gly Pro Lys Gly Thr His Cys Gly Gly Ala Gln Asp
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130 135 140

Gly Phe Cys Ala Ala Trp Gly Cys Glu Thr Thr Gly Glu Ala Trp Trp
145 150 155 160

Lys Pro Thr Ser Ser Trp Asp Tyr Ile Thr Val Lys Arg Gly Ser Ser
165 170 175

Gln Asp Asn Ser Cys Glu Gly Lys Cys Asn Pro Leu Val Leu Gln Phe
180 185 190

Thr Gln Lys Gly Arg Gln Ala Ser Trp Asp Gly Pro Lys Met Trp Gly
195 200 205

Leu Arg Leu Tyr Arg Thr Gly Tyr Asp Pro Ile Ala Leu Phe Thr Val
210 215 220

Ser Arg Gln Val Ser Thr Ile Thr Pro Pro Gln Ala Met Gly Pro Asn
225 230 235 240

Leu Val Leu Pro Asp Gln Lys Pro Pro Ser Arg Gln Ser Gln Thr Gly
245 250 255

Ser Lys Val Ala Thr Gln Arg Pro Gln Thr Asn Glu Ser Ala Pro Arg
260 265 270

Ser Val Ala Pro Thr Thr Met Gly Pro Lys Arg Ile Gly Thr Gly Asp
275 280 285

Arg Leu Ile Asn Leu Val Gln Gly Thr Tyr Leu Ala Leu Asn Ala Thr
290 295 300

Asp Pro Asn Lys Thr Lys Asp Cys Trp Leu Cys Leu Val Ser Arg Pro
305 310 315 320

Pro Tyr Tyr Glu Gly Ile Ala Ile Leu Gly Asn Tyr Ser Asn Gln Thr
325 330 335

Asn Pro Pro Pro Ser Cys Leu Ser Thr Pro Gln His Lys Leu Thr Ile
340 345 350

Ser Glu Val Ser Gly Gln Gly Met Cys Ile Gly Thr Val Pro Lys Thr
355 360 365

His Gln Ala Leu Cys Asn Lys Thr Gln Gln Gly His Thr Gly Ala His
370 375 380

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Tyr Leu Ala Val Pro Asn Gly Thr Tyr Trp Ala Cys Asn Thr Gly Leu
 385 390 395 400
 Thr Pro Cys Ile Ser Met Ala Val Leu Asn Trp Thr Ser Asp Phe Cys
 405 410 415
 Val Leu Ile Glu Leu Trp Pro Arg Val Thr Tyr His Gln Pro Glu Tyr
 420 425 430
 Val Tyr Thr His Phe Ala Lys Ala Val Arg Phe Arg Arg Glu Pro Ile
 435 440 445
 Ser Leu Thr Val Ala Leu Met Leu Gly Gly Leu Thr Val Gly Gly Ile
 450 455 460
 Ala Ala Gly Val Gly Thr Gly Thr Lys Ala Leu Leu Glu Thr Ala Gln
 465 470 475 480
 Phe Arg Gln Leu Gln Met Ala Met His Thr Asp Ile Gln Ala Leu Glu
 485 490 495
 Glu Ser Val Ser Ala Leu Glu Lys Ser Leu Thr Ser Leu Ser Glu Val
 500 505 510
 Val Leu Gln Asn Arg Arg Gly Leu Asp Ile Leu Phe Leu Gln Glu Gly
 515 520 525
 Gly Leu Cys Ala Ala Leu Lys Glu Glu Cys Cys Phe Tyr Ala Asp His
 530 535 540
 Thr Gly Leu Val Arg Asp Asn Met Ala Lys Leu Arg Glu Arg Leu Lys
 545 550 555 560
 Gln Arg Gln Gln Leu Phe Asp Ser Gln Gln Gly Trp Phe Glu Gly Trp
 565 570 575
 Phe Asn Lys Ser Pro Trp Leu Thr Thr Leu Ile Ser Ser Ile Met Gly
 580 585 590
 Pro Leu Leu Ile Leu Leu Leu Ile Leu Leu Phe Gly Pro Cys Ile Leu
 595 600 605
 Asn Arg Leu Val Gln Phe Val Lys Asp Arg Ile Ser Val Val Gln Ala
 610 615 620
 Leu Val Leu Thr Gln Gln Tyr Gln Gln Ile Lys Gln Tyr Asp Pro Asp
 625 630 635 640

Arg Pro

<210> 10
 <211> 479
 <212> PRT
 <213> Feline leukemia virus

<220>
 <221> PEPTIDE
 <222> (1)..(479)
 <223> Amino acid sequence of the protein corresponding to Seq.ID8

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 1 5 10 15

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 20 25 30

Met Ala Asn Pro Ser Pro Pro Arg Ile Tyr Asn Val Thr Trp Val Ile
 35 40 45

Thr Asn Val Gln Thr Asn Thr Gln Ala Asn Ala Thr Ser Met Leu Gly
 50 55 60

Thr Leu Thr Asp Ala Tyr Pro Thr Leu His Val Asp Leu Cys Asp Leu
 65 70 75 80

Val Gly Asp Thr Trp Glu Pro Ile Pro Leu Asn Pro Thr Asn Val Lys
 85 90 95

His Gly Ala Arg Tyr Ser Ser Ser Lys Tyr Gly Cys Lys Thr Thr Asp
 100 105 110

Arg Lys Lys Gln Gln Gln Thr Tyr Pro Phe Tyr Val Cys Pro Gly His
 115 120 125

Ala Pro Ser Leu Gly Pro Lys Gly Thr His Cys Gly Gly Ala Gln Asp
 130 135 140

Gly Phe Cys Ala Ala Trp Gly Cys Glu Thr Thr Gly Glu Ala Trp Trp
 145 150 155 160

Lys Pro Thr Ser Ser Trp Asp Tyr Ile Thr Val Lys Arg Gly Ser Ser
 165 170 175

Gln Asp Asn Ser Cys Glu Gly Lys Cys Asn Pro Leu Val Leu Gln Phe

180 185 190

Thr Gln Lys Gly Arg Gln Ala Ser Trp Asp Gly Pro Lys Met Trp Gly
195 200 205

Leu Arg Leu Tyr Arg Thr Gly Tyr Asp Pro Ile Ala Leu Phe Thr Val
210 215 220

Ser Arg Gln Val Ser Thr Ile Thr Pro Pro Gln Ala Met Gly Pro Asn
225 230 235 240

Leu Val Leu Pro Asp Gln Lys Pro Pro Ser Arg Gln Ser Gln Thr Gly
245 250 255

Ser Lys Val Ala Thr Gln Arg Pro Gln Thr Asn Glu Ser Ala Pro Arg
260 265 270

Ser Val Ala Pro Thr Thr Met Gly Pro Lys Arg Ile Gly Thr Gly Asp
275 280 285

Arg Leu Ile Asn Leu Val Gln Gly Thr Tyr Leu Ala Leu Asn Ala Thr
290 295 300

Asp Pro Asn Lys Thr Lys Asp Cys Trp Leu Cys Leu Val Ser Arg Pro
305 310 315 320

Pro Tyr Tyr Glu Gly Ile Ala Ile Leu Gly Asn Tyr Ser Asn Gln Thr
325 330 335

Asn Pro Pro Pro Ser Cys Leu Ser Thr Pro Gln His Lys Leu Thr Ile
340 345 350

Ser Glu Val Ser Gly Gln Gly Met Cys Ile Gly Thr Val Pro Lys Thr
355 360 365

His Gln Ala Leu Cys Asn Lys Thr Gln Gln Gly His Thr Gly Ala His
370 375 380

Tyr Leu Ala Val Pro Asn Gly Thr Tyr Trp Ala Cys Asn Thr Gly Leu
385 390 395 400

Thr Pro Cys Ile Ser Met Ala Val Leu Asn Trp Thr Ser Asp Phe Cys
405 410 415

Val Leu Ile Glu Leu Trp Pro Arg Val Thr Tyr His Gln Pro Glu Tyr
420 425 430

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Val Tyr Thr His Phe Ala Lys Ala Val Arg Phe Arg Arg Glu Pro Ile
435 440 445

Ser Leu Thr Val Ala Leu Met Leu Gly Gly Leu Thr Val Gly Gly Ile
450 455 460

Ala Ala Gly Val Gly Thr Gly Thr Lys Ala Leu Leu Glu Thr Ala
465 470 475

<210> 11
<211> 1440
<212> DNA
<213> Feline leukemia virus

<220>
<221> gene
<222> (1)..(1440)
<223> DNA sequence of wildtype "env" gene (gp70)

<400> 11
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atatataatg taacttgggt aataaccaat gtacaaacta acaccaagc taacgccacc 180
tctatgttag gaaccttaac cgatgcctac cctaccctac atgttgactt atgtgaccta 240
gtgggagaca cctgggaacc tatagtccta aaccaacca atgtaaaaca cggggcacgt 300
tactcctcct caaaatatgg atgtaaaact acagatagaa aaaaacagca acagacatac 360
ccctttttacg tctgccccgg acatgcccc tcgttggggc caaagggaac acattgtgga 420
ggggcacaag atgggttttg tgccgcatgg ggatgtgaga ccaccggaga agcttggtgg 480
aagcccacct cctcatggga ctatatcaca gtaaaaagag ggagtagtca ggacaatagc 540
tgtgagggaa aatgcaaccc cctgggttttg cagttcaccc agaagggaag acaagcctct 600
tgggacggac ctaagatgtg gggattgcga ctataccgta caggatatga ccctatcgct 660
ttattcacgg tgtcccggca ggtatcaacc attacgccgc ctcaggcaat gggaccaaac 720
ctagtcttac ctgatcaaaa acccccatcc cgacaatctc aaacagggtc caaagtggcg 780
accagaggc cccaaacgaa tgaaagcgcc ccaaggtctg ttgccccac caccatgggt 840
cccaaacgga ttgggaccgg agatagggtta ataaatttag tacaaggac atacctagcc 900
ttaaatgcca ccgaccccaa caaaactaaa gactgttggc tctgcctggt ttctcgacca 960
ccctattacg aagggtattgc aatcttaggt aactacagca accaaacaaa cccccccca 1020
tcctgcctat ctactccgca acacaaacta actatatctg aagtatcagg gcaaggaatg 1080
tgcatagggg ctgttcctaa aaccaccag gctttgtgca ataagacaca acagggacat 1140
acaggggcgc actatctagc cgcccccaac ggcacctatt gggcctgtaa cactggactc 1200

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accccatgca tttccatggc ggtgctcaat tggacctctg atttttgtgt cttaatcgaa 1260
 ttatggccca gagtgactta ccatcaaccc gaatatgtgt acacacattt tgccaaagct 1320
 gtcaggttcc gaagagaacc aatatcacta acggttgccc ttatgttggg aggacttact 1380
 gtagggggca tagccgcggg ggtcgggaaca gggactaaag ccctccttga aacagcctga 1440

<210> 12
 <211> 42
 <212> DNA
 <213> Primer

<220>
 <221> misc_feature
 <222> (1)..(42)
 <223> gag-mut1-rneu

<400> 12
 aattaagagc tccacgtctc cccccgctaa cagcaactgg cg 42

<210> 13
 <211> 45
 <212> DNA
 <213> Primer

<220>
 <221> misc_feature
 <222> (1)..(45)
 <223> gag-mut2-1

<400> 13
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<210> 14
 <211> 48
 <212> DNA
 <213> Primer

<220>
 <221> misc_feature
 <222> (1)..(48)
 <223> gag-mut3-r

<400> 14
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<210> 15
 <211> 48
 <212> DNA
 <213> Primer

<220>
 <221> misc_feature

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<222> (1)..(48)
<223> gag-mut4-l

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48

<210> 16
<211> 34
<212> DNA
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<220>
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<222> (1)..(34)
<223> Felvgag-l

<400> 16
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<210> 17
<211> 37
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<220>
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<222> (1)..(37)
<223> Felvgag-r

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37

<210> 18
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<220>
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<400> 18
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33

<210> 19
<211> 37
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<220>
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<222> (1)..(37)
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<400> 19
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37

<210> 20
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<220>
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<222> (1)..(28)
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<400> 20
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28

<210> 21
<211> 34
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<213> Primer

<220>
<221> misc_feature
<222> (1)..(34)
<223> Primer

<400> 21
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34

<210> 22
<211> 30
<212> DNA
<213> Primer

<220>
<221> misc_feature
<222> (1)..(30)
<223> Primer

<400> 22
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30

<210> 23
<211> 33
<212> DNA
<213> Primer

<220>
<221> misc_feature
<222> (1)..(33)
<223> Primer

<400> 23
taataggctt ctgtgaacag ggcaatgggg tca

33

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<210> 24
 <211> 34
 <212> DNA
 <213> Primer

<220>
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 <222> (1)..(34)
 <223> Primer

<400> 24
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34

<210> 25
 <211> 30
 <212> DNA
 <213> Primer

<220>
 <221> misc_feature
 <222> (1)..(30)
 <223> Primer

<400> 25
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<210> 26
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 <212> DNA
 <213> Primer

<220>
 <221> misc_feature
 <222> (1)..(34)
 <223> Primer

<400> 26
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34

<210> 27
 <211> 27
 <212> DNA
 <213> Primer

<220>
 <221> misc_feature
 <222> (1)..(27)
 <223> Primer

<400> 27
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27

<210> 28
 <211> 31

<212> DNA
<213> Primer

<220>
<221> misc_feature
<222> (1)..(31)
<223> Primer

<400> 28
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31

<210> 29
<211> 35
<212> DNA
<213> Primer

<220>
<221> misc_feature
<222> (1)..(35)
<223> Primer

<400> 29
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<210> 30
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27

<210> 31
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<213> Primer

<220>
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<222> (1)..(36)
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<400> 31
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<210> 32
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28

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<222> (1)..(30)
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<210> 37
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<210> 38
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<213> Primer

<220>
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<222> (1)..(32)
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<400> 38
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<210> 40
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<222> (1)..(28)
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<400> 40

aatatggtct ctctcctcct gcctctgc

28